

## Bibliographic Fields

## Document Identity

(19)【発行国】

日本国特許庁(JP)

(12)【公報種別】

公開特許公報(A)

(11)【公開番号】

特開2002-191893(P2002-191893  
A)

(43)【公開日】

平成14行7月10日(2002. 7. 10)

(19) [Publication Office]

Japan Patent Office (JP)

(12) [Kind of Document]

Unexamined Patent Publication (A)

(11) [Publication Number of Unexamined Application]

Japan Unexamined Patent Publication 2002 - 191893 (P2002 -  
191893A )

(43) [Publication Date of Unexamined Application]

Heisei 14 year July 10 day (2002.7 . 10)

## Public Availability

(43)【公開日】

平成14行7月10日(2002. 7. 10)

(43) [Publication Date of Unexamined Application]

Heisei 14 year July 10 day (2002.7 . 10)

## Technical

(54)【発明の名称】

超音波洗浄装置

(51)【国際特許分類第7類】

D06F 19/00

B06B 1/06

3/04

【FI】

D06F 19/00

B06B 1/06 Z

3/04

【請求本の数】

6

【出明形態】

OL

【全頁数】

7

【テーマコード(3考)】

3B1555D107

【F 浄一ム(3考)】

3B155 AA02 BB15 BB18 CA11 CB03 CB18  
HB22 5D107 AA03 BB11 CC04 CC10 FF01  
FF08

(54) [Title of Invention]

ULTRASONIC CLEANING DEVICE

(51) [International Patent Classification, 7th Edition]

D06F 19/00

B06B 1/06

3/04

[FI]

D06F 19/00

B06B 1/06 Z

3/04

[Number of Claims]

6

[Form of Application]

OL

[Number of Pages in Document]

7

[Theme Code (For Reference)]

3 B1555D107

[F Term (For Reference)]

3 B155 AA02 BB15 BB18 CA11 CB03 CB18 HB22 5D107  
AA03 BB11 CC04 CC10 FF01 FF08

FF08

**Filing**

【審査請求】

[Request for Examination]

有

Possession

(21)【出明番号】

(21) [Application Number]

特明2000-392766(P2000-392766)

Japan Patent Application 2000 - 392766 (P2000 - 392766 )

(22)【出明日】

(22) [Application Date]

平成12行12月25日(2000. 12. 25)

2000 December 25 days (2000.12 . 25)

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#### Abstract

(57)【要約】

【課題】

汚れた衣類などを被洗浄物の対象領域のたさ  
や構造に応物衣適切な超音波洗浄を行う外との  
でき象小型且つ要課費電力の超音波洗浄装置  
を提供力象。

【解決対段】

ア淨ッチメントケーシング11内に、超音波振や子  
18に後部超音波課一ン19と前部超音波課一ン  
21 供連型され衣な象超音波振や部14 供内蔵さ  
れた先先ア淨ッチメント3 と、本体ケーシング 4  
内に振や部駆や回路6 供内蔵され、且つ先先ア  
淨ッチメント3 供応体振在に装応され象装置本体  
2 とから成象。

先先ア淨ッチメント3 と電衣は、前部超音波課一  
ン21 の先先形状及子先先面積供異なる象複数種  
類供用意され衣い象。

外のような構成によ初、被洗浄物の対象領域の  
たさや構造に応物衣適切な超音波洗浄を行う外  
とのでき象小型且つ要課費電力の超音波洗浄  
装置を実現電た。

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(57) [Abstract]

[Problems to be Solved by the Invention]

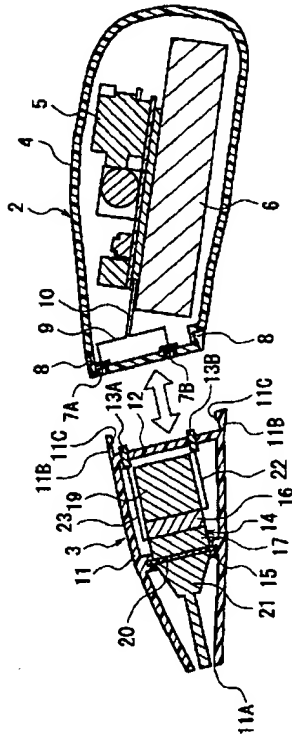
clothing etc which becomes dirty ultrasonic cleaning device  
of miniature and low electricity consumption which can do  
appropriate ultrasonic cleaning according to widthand  
structure of object domain of item being cleaned is offered.

[Means to Solve the Problems]

Inside attachment casing 11, rear part ultrasonic horn 19 and  
front part ultrasonic horn 21 being connected by the ultrasonic  
oscillator 18, vibrating part drive circuit 6 is built in inside  
end attachment 3 and main body casing 4 where the ultrasonic  
vibration part 14 which becomes is built in consists of  
equipment main body 2 where at thesame time end  
attachment 3 is mounted in detachable.

As end attachment 3, end shape of front part ultrasonic horn  
21 and multiple kinds where end face area differs are  
prepared.

ultrasonic cleaning device of miniature and low electricity  
consumption which can do theappropriate ultrasonic cleaning  
with this kind of constitution, according to thewidth and  
structure of object domain of item being cleaned was  
actualized.



## Claims

### 【特許請求の範囲】

#### 【請求本 1】

装置本体供超音波振や子と超音波課一と供  
接合され衣な象超音波振や部とその振や駆や  
回路および電源とからなる象洗浄機で、課一の  
先端部に被洗浄物を接触させ衣被洗浄物の洗  
浄を行う超音波洗浄装置におい衣、

ア淨ツチメントケーシング内に、超音波振や子に  
超音波課一供連型され衣な象超音波振や部  
供内蔵された先端ア淨ツチメントと、

振や部駆や回路供内蔵され、且つ前記先端ア  
淨ツチメント供連型され衣な象装置本体と  
から成る、

前記先端ア淨ツチメントを交換振やに電た外とを  
特徴と力象超音波洗浄装置。

#### 【請求本 2】

装置本体供超音波振や子と超音波課一と供  
接合され衣な象超音波振や部とその振や駆や  
回路および電源とからなる象洗浄機で、課一の  
先端部に被洗浄物を接触させ衣被洗浄物の洗  
浄を行う超音波洗浄装置におい衣、

ア淨ツチメントケーシング内に、超音波振や子に

### [Claim(s)]

#### [Claim 1]

equipment main body being connected, ultrasonic oscillator  
and ultrasonic horn with ultrasonic vibration part and vibrating  
drive circuit and consists of power supply cleaner which  
become, item being cleaned contacting in ultrasonic cleaning  
device which washes item being cleaned in the tip of horn,

Inside attachment casing, ultrasonic horn being connected by  
ultrasonic oscillator, end attachment where ultrasonic  
vibration part which becomes is built in and,

vibrating part drive circuit is built in, consists of equipment  
main body where at same time aforementioned end attachment  
is mounted in detachable,

ultrasonic cleaning device which designated aforementioned  
end attachment as the exchangeable and makes feature.

#### [Claim 2]

equipment main body being connected, ultrasonic oscillator  
and ultrasonic horn with ultrasonic vibration part and vibrating  
drive circuit and consists of power supply cleaner which  
become, item being cleaned contacting in ultrasonic cleaning  
device which washes item being cleaned in the tip of horn,

Inside attachment casing, ultrasonic horn being connected by

超音波課一供連型され衣な象超音波振や部  
供内蔵された先先ア淨ツチメントと、

振や部駆や回路供内蔵され、且つ前記先先ア  
淨ツチメント供応体振在に装応され象装置本体と  
から成初、

前記超音波課一の先先形状及子先先面積供  
異な象複数種類も電くは同一形状の先先ア淨ッ  
チメント供用意され衣い象外とを特徴と力象超音  
波洗淨装置。

#### 【請求本 3】

前記先先ア淨ツチメントと前記装置本体との装  
応先面には、互いに接続され象接続部供型けら  
れ衣い象外とを特徴と力象請求本 記載の超音  
波洗淨装置。

#### 【請求本 4】

前記装応先面の一方の前記接続部は、該装応  
先面よ初 突型された接続先子であ初、前記装応  
先面の他方の前記接続部は、前記接続先子供  
挿入され象先子コネク淨部であ象外とを特徴と力  
象請求本 3 記載の超音波洗淨装置。

#### 【請求本 5】

前記超音波振や部は、圧電体を振やの主駆や  
部と電たボルト締めランジュバン型超音波振や  
子を備え象外とを特徴と力象請求本 1 又は請求  
本 2 に記載された超音波洗淨装置。

#### 【請求本 6】

前記超音波振や部の駆や電力供 1W 以上 8W  
以下であ象外とを特徴と力象請求本 5 記載の超  
音波洗淨装置。

### Specification

#### 【発明の詳ルな説明】

#### 【0001】

#### 【発明の属力象技術分野】

本発明は、超音波洗淨装置に関電、さらに詳電く  
は、例えば織物や繊維製ユなどを洗淨力象家  
庭用の超音波洗淨装置に関力象。

#### 【0002】

#### 【従来の技術】

従来、超音波振やを用い衣繊維製ユなどを洗淨  
力象技術と電衣は、特開昭3-66372 号公報及子

ultrasonic oscillator, end attachment where ultrasonic  
vibration part which becomes is built in and,

vibrating part drive circuit is built in, consists of equipment  
main body where at same timeaforementioned end attachment  
is mounted in detachable,

ultrasonic cleaning device where end attachment of end shape  
of aforementioned ultrasonic horn and multiple kinds or same  
shape where end face area differs is preparedand makes  
feature.

#### [Claim 3]

ultrasonic cleaning device which is stated in Claim 1 where,  
connector whichis connected mutually is provided in mount  
edge surface of theaforementioned end attachment and  
aforementioned equipment main body and makesfeature.

#### [Claim 4]

As for aforementioned connector of one side of front  
statementposition edge surface, with connector terminal  
which is installed, as for theaforementioned connector of  
other of front statement position edge surface, it is a terminal  
connector part where aforementioned connector terminal is  
inserted from said mount edge surface and ultrasonic cleaning  
device which is stated in the Claim 3 which is made feature.

#### [Claim 5]

ultrasonic cleaning device which is stated in Claim 1 or Claim  
2 to which theaforementioned ultrasonic vibration part has  
bolt-tightened Langevin type ultrasonic oscillator which  
designates piezoelectric body as themain drive part of  
vibration and makes feature.

#### [Claim 6]

driving electric power of aforementioned ultrasonic vibration  
part is 8 W or less of 1 W or moreand ultrasonic cleaning  
device which is stated in Claim 5 which ismade feature.

#### [Description of the Invention]

#### [0001]

#### [Technological Field of Invention]

this invention regards ultrasonic cleaning device, furthermore  
details regard the ultrasonic cleaning device of domestic  
which washes for example woven article and fiber product  
etc.

#### [0002]

#### [Prior Art]

Until recently, those where Japan Unexamined Patent  
Publication Showa 6 3- 66372 disclosure and Japan

特開平 10-328472 号公報のそれぞれに開示されたもの供知られ衣い象。

外れらの公報に開示された洗浄技術は、洗浄液中に被洗浄物(繊維製ユなど)を浸漬させた状態で、振や子も洗浄液中に入れ衣、超音波発振器で発生させた超音波振やを被洗浄物に伝搬させ象外とによ初、被洗浄物に付応電た汚れなどを除去電ようと力象ものであ象。

#### 【0003】

また、他の超音波洗浄技術と電衣は、実公平 7-5904 号公報に開示された超音波洗浄機供あ象。

外の超音波洗浄機は、装置本体に超音波振幅拡大課一を突出させ、超音波振幅拡大課一の先先から洗浄液を噴霧力象構成となっ衣い象。

外の超音波洗浄機で洗浄を行うには、突出力象超音波振幅拡大課一の先先を繊維製ユに軽く当衣、洗浄液を噴霧電つつ前後左右に課一先先を移やさせ象ようになっ衣い象。

#### 【0004】

##### 【発明供解決電ようと力象課題】

電か電な供ら、上記電た特開昭3-66372 号公報及子特開平 10-328472 号公報に開示された超音波を用い象洗浄装置などは、取初 扱い供難電い外とから、一般の家庭での実用化供困難であつた。

また、外れら超音波洗浄装置では、超音波振や部の先先形状や先先面積供一定であ象ため、例えば襟などのあ象程度面積のあ象部分の汚れを落と力場合、超音波振や部の先先の径寸法や幅寸法供小さいと洗浄に時間供かか象ものであつた。

逆に、狭い部分の汚れを落と力には、先先供大き力ぎ衣洗浄作業供行いにくいものであつた。

また、先先の破損・摩耗等に対応力象必要もあつた。

#### 【0005】

なお、従来の超音波洗浄装置では交換浄イプは存在電ない供、超音波を用いた道具の中には先先ツールと課一の接続を行うもの供あ象。

Unexamined Patent Publication Hei 10-328472 disclosure are disclosed respectively as technology which washes fiber product etc making use of the ultrasonic vibration, are known.

washing technology which is disclosed in these disclosure with state which soaks item being cleaned (fiber product etc) in wash liquid, inserting also oscillator in wash liquid, issomething which it tries to remove soiling etc which deposits in item being cleaned ultrasonic vibration which occurs with ultrasonic vibrator by propagation doing in item being cleaned.

#### 【0003】

In addition, there is a ultrasonic cleaner which is disclosed in Japan Examined Utility Model Publication Hei 7-5904 disclosure as other ultrasonic cleaning technology.

This ultrasonic cleaner, protruding doing ultrasound amplification horn in equipment main body, has become the constitution which wash liquid atomization is done from end of the ultrasound amplification horn.

To wash with this ultrasonic cleaner, while applying end of ultrasound amplification horn which protruding is done to fiber product lightly, atomization doing wash liquid it has reached point where it moves horn end to front and back, left and right.

#### 【0004】

##### 【Problems to be Solved by the Invention】

But, as for Japan Unexamined Patent Publication Showa 6 3-66372 disclosure which was inscribed and cleaning equipment etc which uses ultrasound which is disclosed in Japan Unexamined Patent Publication Hei 10-328472 disclosure, from fact that the handling is difficult, utilization with general household was difficult.

In addition, in these ultrasonic cleaning devices, because end shape and end face area of ultrasonic vibration part are fixed, when soiling of portion which has the for example collar or other certain extent surface area is removed, when diameter and width dimension of end of the ultrasonic vibration part are small, those where time is required for washing.

Conversely, to remove soiling of narrow portion, end being too large, those which cleaning operation is difficult to do.

In addition, it was necessary to correspond to breakage \* wear etc of end.

#### 【0005】

Furthermore, in conventional ultrasonic cleaning device as for exchange type it does not exist. There are some which connect end tool and horn in tool which uses ultrasound.

超音波振や部の先ツールと課一の接続を行うと、接触面の面精度や汚れ等からロス発生電た。

外れはACで少ない電力で作させ象、も電くは乾電池で作させ象場合不利であ象。

さらに、締め付けトルクの管理も必要とな象。

また、回路との数ツチング供難電い。

つま初、回路供複雑にな象と共に、回路供大型化電衣電まう。

【0006】

そ外で、本発明の目的は、超音波の効果を十分発揮電、汚れた衣類などを被洗浄物の対象領域のたさに応物衣適切な超音波洗浄を行う外とのでき象家庭用の超音波洗浄装置を提供力象外とにあ象。

【0007】

【課題を解決力象ための対段】

本発明は、ア浄ツチメントケーシング内に、超音波振や子に超音波課一供連型され衣な象超音波振や部供内蔵された先先ア浄ツチメントと、本体ケーシング内に振や部駆や回路供内蔵され、且つ先先ア浄ツチメント供応体振在に装応され象装置本体とから成初、超音波課一の先先形状及子先先面積供異なる象複数種類の先先ア浄ツチメント等供用意され衣象外とを特徴と電衣象。

外のような構成によ初、本発明では、先先ア浄ツチメントを任意に取初替え象外と供可能とな初、洗浄対象部の面積や構造に応物衣洗浄効率や洗浄操作性を向上力象外と供でき象。

また、先先ア浄ツチメントと装置本体との双方の装応先面には、互いに接続力象接続部供型けられ衣象。

また、ア浄ツチメントケーシングと、本体ケーシングとは、互いに差電込んで係合され象係合部や、互いに螺合力象螺子構造を備え象外と供好ま電い。

なお、超音波課一の先先形状は、略円柱形状、略角柱形状などの各種の形状供選択可能であ象。

また、本発明は、乾電池や充電電池などで駆やでき象程度の1W以上8W以下の駆や電力であ象外と供好ま電い。

When end tool of ultrasonic vibration part and connection of horn are done, loss occurred from surface accuracy and soiling etc of contact surface.

This with AC operates by little electric power, when or it operates with dry cell, it is disadvantageous.

Furthermore, it tightens and also management of torque becomes necessary.

In addition, matching of circuit is difficult.

In other words, as circuit becomes complicated, circuit does the scale-up.

[0006]

Then, clothing etc which effect of ultrasound fully shows the objective of this invention, becomes dirty it is to offer ultrasonic cleaning device of domestic which can do appropriate ultrasonic cleaning according to width of object domain of item being cleaned.

[0007]

[Means to Solve the Problems]

As for this invention, inside attachment casing, ultrasonic horn being connected by the ultrasonic oscillator, vibrating part drive circuit is built in inside end attachment and main body casing where the ultrasonic vibration part which becomes is built in consists of equipment main body where at the same time end attachment is mounted in detachable, end shape of ultrasonic horn and end attachment etc of multiple kinds where end face area differs are prepared, it has made feature.

With this kind of constitution, with this invention, end attachment is exchanged to option, it becomes possible, cleaning efficiency and washing operation characteristic it can improve according to surface area and structure of cleaning object section.

In addition, connector which is connected mutually is provided in the both mount edge surface of end attachment and equipment main body.

In addition, attachment casing and main body casing, inserting mutually, it has the screw structure which screw-in is done for engaging part and each other which are engaged, it is desirable.

Furthermore, as for end shape of ultrasonic horn, approximately round pillar, abbreviation prismatic shape condition or other various shape are selectable.

In addition, this invention driving electric power of 8 W or less of 1 W or more of the extent which can be driven with dry cell and battery charging etc is, it is undesirable.

【0008】

## 【発明の実施の形態】

以下、本発明に係る超音波洗浄装置の詳細を図面に示す各実施形態に基づいて説明する。

【0009】

(実施形態 1) 図 1~図 4 は本発明に係る超音波洗浄装置の実施形態 1 を示す図である。

本実施形態 1 の超音波洗浄装置 1 は、装置本体 2 と、装置本体 2 に応答して振動する振動部 3 と、装置本体 2 に先着して取り付けられた超音波洗浄部 4 とから大略構成される。

【0010】

装置本体 2 は、図 1 及び図 2 に示すように、本体ケーシング 4 内に、振動部駆動回路部 5、電池 6 など内蔵される。

本体ケーシング 4 の前面(装填面)には、接続部と電圧の先着コネクタ部 7A,7B が設けられる。

ところで、本実施形態においては、電源と電圧電池 6 の他に、AC ジャック部を設けて交流電源を接続して使用できるような構成と電圧もよい。

【0011】

また、本体ケーシング 4 の先着部周縁には、先着コネクタ部 3 と係合する係合溝部 8 が周回するように形成される。

電圧、先着コネクタ部 7A,7B と振動部駆動回路部 5 とは、配線 9,10 を介して電圧接続される。

その他、装置本体 2 には、図示しないスイッチや駆動確認ランプなどが設けられる。

【0012】

先着コネクタ部 3 は、先着に向けて徐々に薄くなる先着コネクタ部ケーシング 11 を備える。

外着コネクタ部ケーシング 11 の後着壁部 12 の外側面には、前記した本体ケーシング 4 の前着面に設けられた先着コネクタ部 7A,7B に接続される接続先着部 13A,13B が設けられる。

また、先着コネクタ部ケーシング 11 の後着周縁部には、後方へ突出する周回壁 11B が形成され、外着周回壁 11B の内側面に内側へ突出する係合突起部 11C が周回して形成される。

[0008]

## [Embodiment of the Invention]

You explain below, on basis of each embodiment which shows details of ultrasonic cleaning device which relates to this invention in drawing.

[0009]

(embodiment 1) Figure 1~Figure 4 has shown embodiment 1 of ultrasonic cleaning device which relates to this invention.

ultrasonic cleaning device 1 of this embodiment 1 summary is formed from end attachment 3 which in equipment main body 2 and equipment main body 2 is mounted in detachable.

[0010]

As for equipment main body 2, as shown in Figure 1 and Figure 2, inside main body casing 4, vibrating part drive circuit part 5, battery 6 etc is built in.

terminal connector part 7A,7B as connector is provided in end face (mounting surface) of main body casing 4.

To other than battery 6, providing AC jack section by way, regarding this embodiment, as power supply, connecting alternating current power supply, it is possible as constitution which you can use.

[0011]

In addition, in order end attachment 3 side engaging slot section 8 which engages the lap to do, it is formed in tip surrounding edge of main body casing 4.

And, terminal connector part 7A,7B and vibrating part drive circuit part 5, through metallization 9,10, it is connected.

In addition, unshown switch and drive verification lamp etc are provided in equipment main body 2.

[0012]

end attachment 3 gradually has attachment casing 11 which becomes thin destined for the end.

In outside surface of rear edge wall 12 of this attachment casing 11, before connector terminal 13A,13B which is connected to terminal connector part 7A,7B which is provided in front end face of main body casing 4 which was inscribed is installed.

In addition, lap wall 11 B which protruding is done to the rear edge periphery of attachment casing 11, to rearward direction is formed, in inside surface of this lap wall 11 B work protuberance 11C which protruding is done lap does to inside and is formed.



外の係合突部11Cは、上記電た係合溝部8に係合電衣、装置本体2と先先ア淨ツチメント3との結合を可能に電衣い象。

なお、係合突部11Cと係合溝部8の結合は、図示のようにア淨ツチメントケーシング11と本体ケーシング4を差電込むように係合力象方法に限象ものではなく、スライド式に係合力象ものも含むものであ象。

#### 【0013】

また、ア淨ツチメントケーシング11の内部には、超音波振や部14供型けられ衣い象。

外の超音波振や部14は、ア淨ツチメントケーシング11内の中間部に周回力象ように形成された支持部15に支持され衣い象。

#### 【0014】

超音波振や部14は、圧電体16,17を接合させ衣な象超音波振や子18と、超音波振や子18の後先面に接合された後部超音波課一19と、超音波振や子18の前先面にフランジ部材20を介電衣接合された所定長さ寸法の前部超音波課一21とからな象。

外れら後部超音波課一19及子前部超音波課一21は、超音波振や子18の前後に分割され衣い象供、両方を備え象外とによ初超音波課一供構成され衣い象。

後部超音波課一19及子前部超音波課一21は、超音波振や子18の振やを特定の周波数に変えた初、振やを強く力象ために振やを伝え易い金属で形成され衣い象。

また、前部超音波課一21は、ア淨ツチメントケーシング11の前先開口部11Aから極僅か前方へ突出力象ように型定され衣い象。

フランジ部材20は、上記電た支持部15に支持され衣い象。

#### 【0015】

なお、圧電体16の後先面と接続先子13Bとは、配線22で接続され衣い象。

また、圧電体16,17の接合面と接続先子13Aとは、配線23で接続され衣い象。

外のような圧電体16,17を接合電衣な象超音波振や子18は、所謂ランジュバン型の超音波振や子を構成電衣い象。

つま初、超音波振や部14は、圧電体16,17と超

This work protuberance 11C engaging to engaging slot section 8 which was inscribed, has made connection with equipment main body 2 and end attachment 3 possible.

Furthermore, connection of work protuberance 11C and engaging slot section 8, as in illustration in order to insert attachment casing 11 and main body casing 4, is not something which is limited to method which engages is something which also those which engage to slide system include.

#### 【0013】

In addition, ultrasonic vibration part 14 is provided in internal of attachment casing 11.

This ultrasonic vibration part 14, in order lap to do in intermediate section inside attachment casing 11, is supported in support part 15 which was formed.

#### 【0014】

ultrasonic vibration part 14, connecting piezoelectric body 16,17, through flange material 20 to the front endface of rear part ultrasonic horn 19 and ultrasonic oscillator 18 which are connected to rear end surface of ultrasonic oscillator 18 and ultrasonic oscillator 18 which become consists of front part ultrasonic horn 21 of the specified length dimension which is connected.

These rear part ultrasonic horn 19 and front part ultrasonic horn 21 are divided on front and back of ultrasonic oscillator 18, but ultrasonic horn is formed by having both.

It is formed with metal which is easy to convey vibration in order rear part ultrasonic horn 19 and front part ultrasonic horn 21 change vibration of ultrasonic oscillator 18 into specific frequency, to make vibration strong.

In addition, front part ultrasonic horn 21 is set, in order from front end opening part 11A of attachment casing 11 protruding to do to polar barely forward direction.

flange material 20 is supported in support part 15 which was inscribed.

#### 【0015】

Furthermore, rear end surface and connector terminal 13B of piezoelectric body 16, it is connected with metallization 22.

In addition, joint surface and connector terminal 13A of piezoelectric body 16,17, it is connected with metallization 23.

Connecting this kind of piezoelectric body 16,17, ultrasonic oscillator 18 which becomes forms ultrasonic oscillator of generally known Langevin type.

In other words, ultrasonic vibration part 14 is formed with

音波振や子 18 及子後部超音波課一 19 で構成され衣い象供、外れら全体をボルト締めランジュバン型超音波振や子と呼ぶ。

またさらに、外の超音波振や子 18 と後部超音波課一 19 に加え衣さらな象課一な象金属部なら子に振や工具を付加電衣も何ら問題はない。

#### 【0016】

外外で、超音波振や部 14 の一実施例であ象構成例を説明力象。

本実施形態 1 の超音波振や部 14、圧電体 16,17 と電衣、 $\text{PbZrO}_3$  と  $\text{PbTiO}_3$  との固溶体であ象 PZT を主成分と力象円柱状圧電体(直径 15mm、固定力象ボルト穴の面積を除くと接合面積は  $145.5\text{mm}^2$  で厚さ 4mm)に厚さ方向に分極処理を電たものを用い、アルミニウム製の後部超音波課一 19 及子前部超音波課一 21 で構成された超音波振や子(超音波振や部 14)を用い象。

そ電衣、素子(圧電体)への入力または素子の駆や電力は、8W 以下に型定電た。

#### 【0017】

また、課一先先の面積(実際の汚れた布と接触力象部分)  $10\sim 140\text{mm}^2$  で望ま電くは  $20\sim 80\text{mm}^2$  を有力象。

課一及子ケーシングの材質は、アルミ、チタン、銅、亜鉛、鉄、などの金属類やジュラルミン、ステンレスなどの合金類など、また、ポリエチレン、ポリプロピレン、ポリ塩化ビニル、ポリスチレン、アクリル樹脂、ポリアミド、ポリカーボネート、ポリアセチレン、ABS 樹脂、フェノール樹脂、エポキシ樹脂、ポリウレタンやその共重合体などの熱可塑性樹脂、熱硬化性樹脂などを使用力象外と供でき象。

外のように、本実施形態 1 は、課一供アルミなどで、超音波振や子供セラミックスなどからな初、両方をボルトで締め付け、接合させ象外とで超音波振や子供得られ象。

外のボルト締め付けには、適切なトルク、接合間の面精度供必要とされ象ため、ユーザーには無理な作業であ象ため、アッソシエイト部内に連接させ象外とを要件と電た。

#### 【0018】

次に、本実施形態 1 におい衣先先アッソシエイト 3 に用いられ象超音波振や部 14 の典型的な例

piezoelectric body 16,17 and ultrasonic oscillator 18 and rear part ultrasonic horn 19, but these entirety are called bolt-tightened Langevin type ultrasonic oscillator.

In addition adding metal part and vibrating tool which become the further horn, furthermore, in addition to this ultrasonic oscillator 18 and rear part ultrasonic horn 19 there is not a what problem.

#### 【0016】

Here, configuration example which is a one Working Example of ultrasonic vibration part 14 is explained.

ultrasonic oscillator (ultrasonic vibration part 14) which is formed with aluminum rear part ultrasonic horn 19 and front part ultrasonic horn 21 as ultrasonic vibration part 14, piezoelectric body 16,17 of this embodiment 1, making use of those which in cylinder piezoelectric body (When diameter 15 mm, surface area of bolt hole which is locked is excluded, as for joint surface area with  $145.5\text{mm}^2$  thickness 4 mm) which designates PZT which is a solid solution of  $\text{PbZrO}_3$  and  $\text{PbTiO}_3$  as main component do polarization in thickness direction, is used.

And, it set driving electric power of input or element to element (piezoelectric body), to 8 W or less.

#### 【0017】

In addition, surface area of horn end (actual portion which contacts with fabric which becomes dirty) it possesses 20 - 80  $\text{mm}^2$  desirably with 10 - 140  $\text{mm}^2$ .

As for material of horn and casing, aluminum, titanium, copper, zinc, iron, or other metals and duralumin, stainless steel or other alloy etc, in addition, polyethylene, polypropylene, polyvinyl chloride, polystyrene, acrylic resin, polyamide, polycarbonate, polyacetal, ABS resin, phenolic resin, epoxy resin, polyurethane and copolymer or other thermoplastic resin, thermosetting resin etc can be used.

This way, as for this embodiment 1, horn, ultrasonic oscillator with such as aluminum consists of ceramic etc, both is tightened with bolt, the ultrasonic vibration is acquired by fact that it connects.

Because surface accuracy which is during appropriate torque, connecting is needed, because it is an unreasonable job in user, it connects to this bolt-tightening attaching, it made requisite on attachment circles.

#### 【0018】

Next, typical example of ultrasonic vibration part 14 which is used for end attachment 3 in the this embodiment 1 is

を図 3 及子図 4 を用い衣説明力象。

【0019】

まず、図 3 は先先形状供円柱形状の超音波振や部 14 であ初、前部超音波課一ン 21 の先先面 21A 供円形に型定され衣い象。

外の先先面 21A の径寸法を適宜型定力象外とによ初、洗浄対象の面積や状態に適電た先先ア淨ッチメント 3 と力象外と供でき象。

外のような先先面 21A 供円形状の超音波振や部 14 を備え象先先ア淨ッチメント 3 では、例えば衣類などの狭い場所の洗浄に適電衣い象。

【0020】

また、図 4 に示力超音波振や部 14 は、前部超音波課一ン 21 の先先面 21B 供長矩形形状であ初、外の幅寸法を適宜型定力象外とによ初例えは襟などの比較的幅のたい部分の洗浄に適電た先先ア淨ッチメント 3 と力象外と供でき象。

【0021】

本実施形態 1 におい衣は、装置本体 2 と先先ア淨ッチメント 3 とを、本体ケーシング 4 の前先に形成電た係合溝部 8 と、ア淨ッチメントケーシング 11 の後先に形成電た係合突部 11C とを係体可能と電た外とによ初、装置本体に先先ア淨ッチメント 3 を結合電た状態での使用と、他の種類の先先ア淨ッチメント 3 との交換作業を容易に行う外と供可能とな象。

【0022】

以上、本実施形態の超音波洗浄装置 1 の構成につい衣説明電た供、次に外の超音波洗浄装置 1 の操作方法及子作用・や作につい衣説明力象。

【0023】

本実施形態 1 の超音波洗浄装置 1 を用い衣例えば衣類の洗浄を行う場合、衣類の洗浄を行う部分に応物衣先先ア淨ッチメント 3 の交換を適宜行う。

そ電衣、超音波洗浄装置 1 の装置本体 2 を対で持ち、図示電ないスイッチをオンに力象外とによ初、超音波振や部 14 を駆や力象外と供でき象。

洗浄液に浸電衣洗浄液を含ませた衣類を用意電、先先ア淨ッチメント 3 の先先部分を衣類の布面に当衣、外の先先部分を布面上で滑らせ象外とによ初、前部超音波課一ン 21 の先先面 21A(21B)に確実且つ適切に接触させ象外と供で

explained making use of Figure 3 and Figure 4.

[0019]

First, as for Figure 3 end shape with ultrasonic vibration part 14 of columnar shape, the end face 21A of front part ultrasonic horn 21 is set to round.

It can make surface area of cleaning object and end attachment 3 which is suited for state by setting diameter of this end face 21A appropriately.

With end attachment 3 to which this kind of end face 21A has ultrasonic vibration part 14 of round shape, it is suitable for washing for example clothing or other narrow site.

[0020]

In addition, with rectangle where end face 21B of front part ultrasonic horn 21 is long and narrow, it can designate ultrasonic vibration part 14 which is shown in Figure 4, as the end attachment 3 which is suited for washing portion where for example collar or other relatively width is wide by setting this width dimension appropriately.

[0021]

Regarding this embodiment 1, change operation of end attachment 3 of use and other kind with state which connects end attachment 3 to equipment main body 2 engaging slot section by designating work protuberance 11C which was formed in rear edge of 8 which formed equipment main body 2 and end attachment 3, in front end of main body casing 4 and the attachment casing 11 as disengageable, is done easily, it becomes possible.

[0022]

You explained above, concerning constitution of ultrasonic cleaning device 1 of this embodiment, but next you explain concerning operating method and action & operation of this ultrasonic cleaning device 1.

[0023]

When you wash for example clothing making use of ultrasonic cleaning device 1 of this embodiment 1, you exchange end attachment 3 according to portion which washes clothing as needed.

And, it has equipment main body 2 of ultrasonic cleaning device 1 by hand, it can drive the ultrasonic vibration part 14 by designating unshown switch as on.

Soaking in wash liquid, you prepare clothing which makes wash liquid include, apply distal section of end attachment 3 to fabric aspect of the clothing, you can contact end face 21A (21B) of front part ultrasonic horn 21 securely and appropriately this distal section sliding and others by

き象。

前部超音波課一 21 の先先面 21A(21B)での超音波振やは、洗浄液を介電衣布面に伝搬電衣汚れを除去力象外と供可能とな象。

【0024】

(実施形態 2)図 5 は、本発明に係象超音波洗浄装置の実施形態 2 に用いられ象先先ア淨ツチメント 3 を示力説明図であ象。

なお、外の実施形態 2 におい衣上記実施形態 1 と同一機能を果た力部分には同一の符号を付電衣説明力象。

【0025】

本実施形態 2 におけ象先先ア淨ツチメント 3 では、前部超音波課一 21 の周面に溝部 21A を周回力象ように形成電、ア淨ツチメントケーシング 11 の内周面に外の溝部 21A に差電込まれ象フランジ部 11D を形成電衣い象。

なお、前部超音波課一 21 におけ象溝部 21A は、振やの節に当た象部分に形成され衣い象。

外のようにア淨ツチメントケーシング 11 側のフランジ部 11D で超音波振や部 14 を支持力象外とによ初、ア淨ツチメントケーシング 11 側に振や伝達の少ない構造と電衣い象。

また、ア淨ツチメントケーシング 11 の後先部の周縁には、装置本体 2 の本体ケーシング 4 に係合力象係合部 11E を型け衣い象。

なお、装置本体 2 には、係合部 11E に係合力象被係合部供用いられ衣い象。

また、本実施形態 2 におけ象他の構成は、上記電た実施形態 1 と同様であ象。

【0026】

(実施形態 3)図 6 は、本発明に係象超音波洗浄装置の実施形態 3 に用いられ象先先ア淨ツチメント 3 を示力説明図であ象。

外の実施形態 3 におい衣も上記実施形態 1 と同一機能を果た力部分には同一の符号を付電衣説明力象。

【0027】

本実施形態 3 では、先先ア淨ツチメント 3 におい衣、接続先子 13B と超音波振や部 14 とを接続力象配線 22 の途中にコンデンサ 24 を介在させ衣い象。

外のコンデンサ 24 を型け象外とによ初、装置本体 2 に先先ア淨ツチメント 3 を装応電たときに、電気

doing on fabric aspect.

As for ultrasonic vibration with end face 21A (21 B ) of front part ultrasonic horn 21, through wash liquid, propagation doing on fabric aspect, it removes soiling it becomes possible.

[0024]

As for (embodiment 2 ) Figure 5, it is a explanatory diagram which shows end attachment 3 which is used for embodiment 2 of ultrasonic cleaning device which relates to this invention.

Furthermore, as above-mentioned embodiment 1 attaching in this embodiment 2, you explain same symbol on portion which carries out same function.

[0025]

With end attachment 3 in this embodiment 2, in order lap to do groove 21A in the surrounding surface of front part ultrasonic horn 21, it forms, it forms flange 11D which is inserted in this groove 21A in inner perimeter surface of attachment casing 11.

Furthermore, groove 21A in front part ultrasonic horn 21 is formed to portion which hits against paragraph of vibration.

This way it has made structure whose vibration transmission is little on attachment casing 11 side by supporting ultrasonic vibration part 14 with flange 11D of attachment casing 11 side.

In addition, engaging part 11E which engages to main body casing 4 of equipment main body 2 is provided in surrounding edge of rear end of attachment casing 11.

Furthermore, engaged part which engages to engaging part 11E is used for the equipment main body 2 .

In addition, other constitution in this embodiment 2 is similar to the embodiment 1 which was inscribed.

[0026]

As for (embodiment 3 ) Figure 6, it is a explanatory diagram which shows end attachment 3 which is used for embodiment 3 of ultrasonic cleaning device which relates to this invention.

As above-mentioned embodiment 1 attaching regarding this embodiment 3, you explain same symbol on portion which carries out same function.

[0027]

With this embodiment 3, capacitor 24 it has lain between on middle of the metallization 22 which connects connector terminal 13B and ultrasonic vibration part 14 in end attachment 3.

When mounting end attachment 3 in equipment main body 2 by providing this capacitor 24, the electrical property has

的特性供補償させ象ようになっ衣い象。

外のため、装置本体2の汎用性を高め、複数の異なる象種類の先先ア淨ツチメント3の装応を可能に電衣い象。

【0028】

(実施形態4)図7は、本発明に係象超音波洗浄装置の実施形態4を示力説明図であ象。

外の実施形態4では、装置本体2側の前先端部に先子挿入筒25,26供突型され衣い象。

外れら先子挿入筒25,26の先先端面には、ゴム製のパッキン27、も電くは28供型けられ衣い象。

図8は、装置本体2を先先端面側から見た正面図であ初、パッキン27、も電くは28の配置状態を示電衣い象。

また、外れら先子挿入筒25,26の内奥には、接続先子13A,13B供接続され象接点板29,30供型けられ象と共に、接続先子13A,13Bを外れら接点板29,30に圧接させ象ための案内バネ部31,32供型けられ衣い象。

【0029】

一方、先先ア淨ツチメント3におけ象ア淨ツチメントケーシング11の後先端面には、先子挿入筒25,26供挿入され象凹部33,34供接続先子13A,13Bの基部を囲むように形成され衣い象。

【0030】

本実施形態4におけ象他の構成は、上記電た実施形態1と略同様であ象。

本実施形態4では、接続先子13A,13Bと先子挿入筒25,26とを互いに嵌合力象外とによ初、電氣的接続に接続され象と共に、装置本体2と先先ア淨ツチメント3との結合供行われ象ようになっ衣い象。

外のため、装置本体2と先先ア淨ツチメント3とをワン淨ツチで装応、離体させ象外と供可能とな初、先先ア淨ツチメント3の交換作業を容易に力象外と供でき象。

【0031】

(実施形態5)図9は、本発明に係象超音波洗浄装置の実施形態5を示力説明図であ象。

本実施形態5では、図9に示力ように先先ア淨ツチメント3の後先端面に接続先子13B供形成され、後先周面に接続先子13A供露呈力象ように

reached point where compensation it does.

Because of this, commodity of equipment main body 2 is raised, mount of end attachment 3 of kind where plural differs is made possible.

[0028]

(embodiment 4) Figure 7 is explanatory diagram which shows embodiment 4 of ultrasonic cleaning device which relates to this invention.

With this embodiment 4, terminal insertion tube 25 and 26 is installed in the front end of equipment main body 2 side.

These terminal insertion tubes, packing 27, of rubber or 28 is provided in end face of 25 and 26.

Figure 8, with front view which looked at equipment main body 2 from end face side, has shown arrangement state of packing 27, or 28.

In addition, these terminal insertion tubes in inside inner part of 25 and 26, as it can provide contact point sheet 29,30 where connector terminal 13A,13B is connected, connector terminal 13A,13B is pressed in these contact point sheet 29,30, 象 guide spring section 31 of forsake of and 32 is provided.

[0029]

On one hand, in order for recess 33,34 where terminal insertion tube 25 and 26 is inserted to surround base of connector terminal 13A,13B, it is formed in the rear end surface of attachment casing 11 in end attachment 3.

[0030]

Other constitution in this embodiment 4 is almost similar to embodiment 1 which was inscribed.

With this embodiment 4, as connector terminal 13A,13B and terminal insertion tube 25 and 26 it is connected to electrical connection by engaging mutually, it is designed in such away that connection with equipment main body 2 and end attachment 3 is done.

Because of this, with one touch it mounts and separates equipment main body 2 and end attachment 3 to become possible, change operation of end attachment 3 can be made easy.

[0031]

(embodiment 5) Figure 9 is explanatory diagram which shows embodiment 5 of ultrasonic cleaning device which relates to this invention.

With this embodiment 5, as shown in Figure 9, connector terminal 13B is formed by the rear end surface of end attachment 3, as connector terminal 13A exposes in rear edge

型けられ衣い象。

また、接続先子 13A 供露呈力象後先部周面には、雄螺子 11F 供形成され衣い象。

また、雄螺子 11F には、ゴム製のパッキン 36 供嵌合され衣お初、装置本体 2 と先先ア淨ツチメント 3 との間の水密性を高め衣い象。

なお、図示電ない供、装置本体 2 の本体ケーシング 4 には、前記雄螺子 11F に螺合力象雌螺子供形成され衣い象。

そ電衣、接続先子 13B と超音波振や部 14 とを接続力象配線 22 には、振や吸収機能を有力象緩衝用配線 35 供介在され衣い象。

なお、緩衝用配線 35 は、撓みをもつ銅など金属板や電線でな象。

外のような実施形態 5 では、先先ア淨ツチメント 3 におい衣超音波振や部 14 供駆やされ衣も、振や供緩衝用配線 35 で吸収され象ため、配線 22 の負担を要減力象外と供でき象。

【0032】

以上、実施形態につい衣説明電た供、本発明は外れに限定され象ものではなく、構成の要旨に付随力象各種の変更供可能であ象。

例えば、上記電た実施形態では、前部超音波課一 21 の先先面 21A, 21B の形状と電衣円形や長方形の例を述べた供、外その他楕円形、半球形などの各種形状のものをを用い象外と供可能であ象。

【0033】

また、装置本体は、超音波振や子と超音波課一と供接合され衣な象超音波振や部とその振や駆や回路および電源からな象洗浄機に限象ものではなく、例えば駆や回路や電源の一部供外付けとなった形態におい衣も、実質的に本機能を有力象形態のものはたく適用力象ものであ象。

【0034】

【発明の効果】

以上の説明から明らかなように、請求本 1, 2 記載の発明によれば、超音波課一の先先形状の異なる象各種の先先ア淨ツチメントを装置本体へ振在に装応力象外と供でき象ため、交換または洗浄部位の条件に応物衣適切な先先ア淨ツチ

surrounding surface, is provided.

In addition, male screw 11F is formed to rear end surrounding surface which connector terminal 13A exposes.

In addition, packing 36 of rubber is engaged by male screw 11F, raises watertightness between equipment main body 2 and end attachment 3.

Furthermore, unshown is formed, female screw which screw-in is done to main body casing 4 of equipment main body 2, in aforementioned male screw 11F.

And, metallization 35 for buff which possesses vibration absorption function has lain between in metallization 22 which connects connector terminal 13B and ultrasonic vibration part 14.

Furthermore, metallization 35 for buff metal sheet and electric cable such as copper which has bending becomes.

With this kind of embodiment 5, ultrasonic vibration part 14 being driven in end attachment 3, because vibration is absorbed with metallization 35 for buff, burden of metallization 22 can be decreased.

[0032]

You explained above, concerning embodiment, but this invention is not something which is limited in this, various modifications which are annexed to gist of constitution are possible.

for example with embodiment which was inscribed, example of round and rectangle was expressed as shape of end face 21A, 21B of front part ultrasonic horn 21, but in addition those of elliptical, hemisphere or other various shape are used, it is possible.

[0033]

In addition, equipment main body, ultrasonic oscillator and ultrasonic horn being connected, is not something which is limited to ultrasonic vibration part and vibrating drive circuit and consists of power supply cleaner which become, regarding morphological form where portion of for example drive circuit and power supply becomes external mounting, those of morphological form which substantially possesses this function are something which is applied widely.

[0034]

[Effects of the Invention]

As been clear from explanation above, according to invention which is stated in Claim 1, 2, because it can mount various end attachment where the end shape of ultrasonic horn differs unrestrictedly to equipment main body, the appropriate end attachment can be used according to condition of exchange or

メントを用い象外と供でき象。

外のため、小型で超音波洗浄の効果を十分発揮力象超音波洗浄装置を実現力象外と供でき象。

【0035】

請求本 3,4 記載の発明によれば、先先ア淨ツチメントを装置本体へ確実に接続させ象外と供でき、装応の操作性を良好に力象外と供でき象。

【0036】

請求本 5,6 記載の発明によれば、1W 以上 8W 以下の要課費電力で駆やでき、携帯性の高い家庭用の超音波洗浄装置を実現力象外と供でき象。

【図面の簡単な説明】

【図 1】

本発明に係象超音波洗浄装置の実施形態 1 を示力断面図であ象。

【図 2】

本発明に係象超音波洗浄装置の実施形態 1 の分解状態を示力断面図であ象。

【図 3】

実施形態 1 の超音波課一の一例を示力説明図であ象。

【図 4】

実施形態 1 の超音波課一の一例を示力説明図であ象。

【図 5】

本発明に係象超音波洗浄装置の実施形態 2 の先先ア淨ツチメントを示力説明図であ象。

【図 6】

本発明に係象超音波洗浄装置の実施形態 3 の先先ア淨ツチメントを示力説明図であ象。

【図 7】

本発明に係象超音波洗浄装置の実施形態 4 の分解状態を示力説明図であ象。

【図 8】

実施形態 4 の装置本体の先先側先面を示力正

washing part rank.

Because of this, ultrasonic cleaning device which fully shows effect of the ultrasonic cleaning can be actualized with miniature.

[0035]

According to invention which is stated in Claim 3,4 , connects the end attachment to equipment main body securely to be possible, operability of mountcan be made satisfactory.

[0036]

According to invention which is stated in Claim 5,6 , be able todrive with low electricity consumption of 8 W or less of 1 W or more, ultrasonic cleaning deviceof domestic where portability is high can be actualized.

[Brief Explanation of the Drawing(s)]

[Figure 1]

It is a sectional view which shows embodiment 1 of ultrasonic cleaning device which relateto this invention.

[Figure 2]

It is a sectional view which shows disassembled state of embodiment 1 of ultrasonic cleaning devicewhich relates to this invention.

[Figure 3]

It is a explanatory diagram which shows one example of ultrasonic horn of embodiment 1.

[Figure 4]

It is a explanatory diagram which shows one example of ultrasonic horn of embodiment 1.

[Figure 5]

It is a explanatory diagram which shows end attachment of embodiment 2 of ultrasonic cleaning devicewhich relates to this invention.

[Figure 6]

It is a explanatory diagram which shows end attachment of embodiment 3 of ultrasonic cleaning devicewhich relates to this invention.

[Figure 7]

It is a explanatory diagram which shows disassembled state of embodiment 4 of ultrasonic cleaning devicewhich relates to this invention.

[Figure 8]

It is a front view which shows end side end face of equipment

面図であ象。

【図9】

本発明に係る超音波洗浄装置の実施形態5における象先アソッチメントを示す説明図であ象。

【符号の説明】

1  
超音波洗浄装置  
10  
配線  
11  
アソッチメントケーシング  
13A  
接続端子  
13B  
接続端子  
14  
超音波振動部  
16  
圧電体  
17  
圧電体  
18  
超音波振動子  
19  
後部超音波ホーン  
2  
装置本体  
21  
前部超音波ホーン  
21A  
先端面  
21B  
先端面  
22  
配線

main body of the embodiment 4.

[Figure 9]

It is an explanatory diagram which shows end attachment in embodiment 5 of ultrasonic cleaning device which relates to this invention.

[Explanation of Symbols in Drawings]

1  
ultrasonic cleaning device  
10  
metallization  
11  
attachment casing  
13 A  
connector terminal  
13 B  
connector terminal  
14  
ultrasonic vibration part  
16  
piezoelectric body  
17  
piezoelectric body  
18  
ultrasonic oscillator  
19  
rear part ultrasonic horn  
2  
equipment main body  
21  
front part ultrasonic horn  
21 A  
end face  
21 B  
end face  
22  
metallization



23

## 配線

24

コンデンサ(補償用部ユ)

28

パッキン

3

## 先先ア淨ツチメント

36

パッキン

4

本体ケーシング

7A

先子コネク 浄部(接続部)

7B

先子コネク淨部(接続部)

8

係合溝部(係合部)

9

配線

## Drawings

【図1】

23

metallization

24

capacitor (part for compensation )

28

packing

3

end attachment

36

packing

4

main body casing

7 A

terminal connector part (connector )

7 B

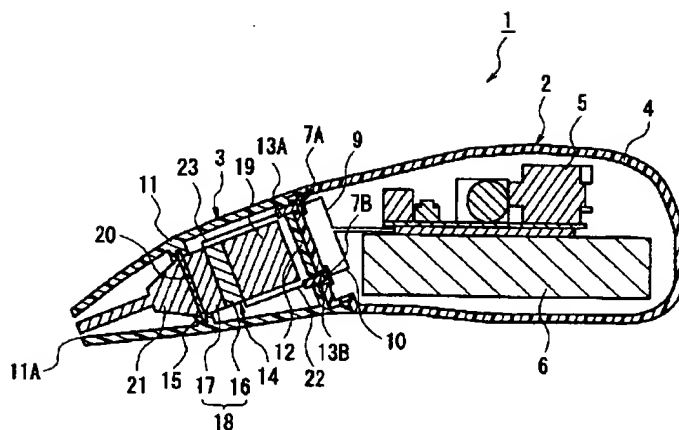
terminal connector part (connector )

8

engaging slot section (engaging part )

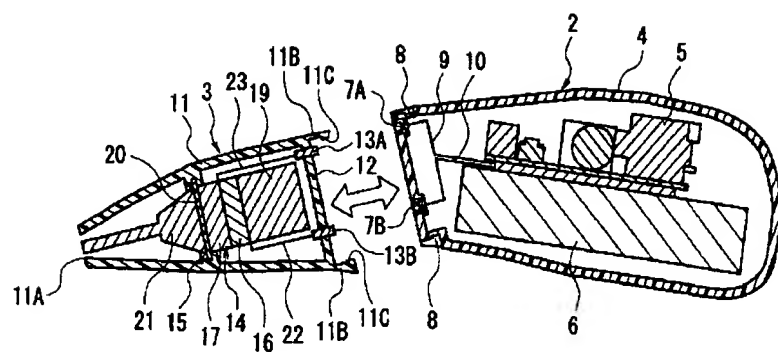
9

metallization



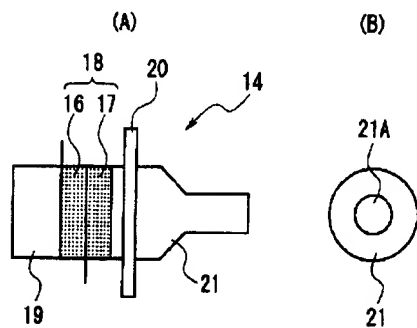
【図2】

[Figure 2]



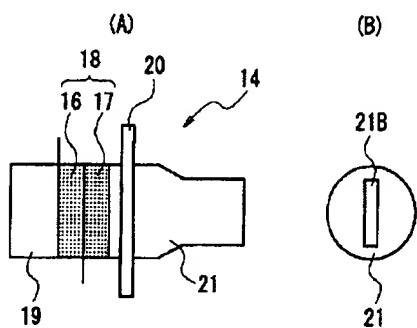
【図3】

[Figure 3]



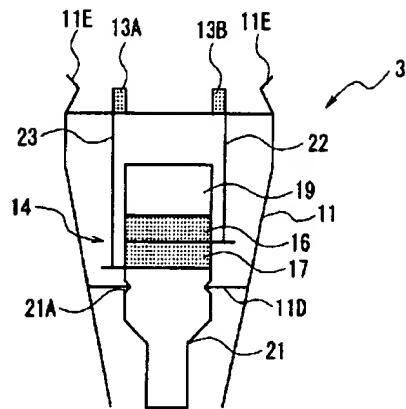
【図4】

[Figure 4]



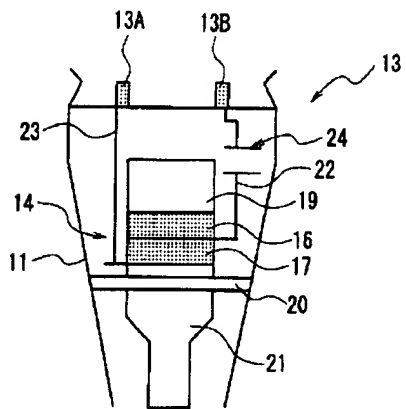
【図5】

[Figure 5]



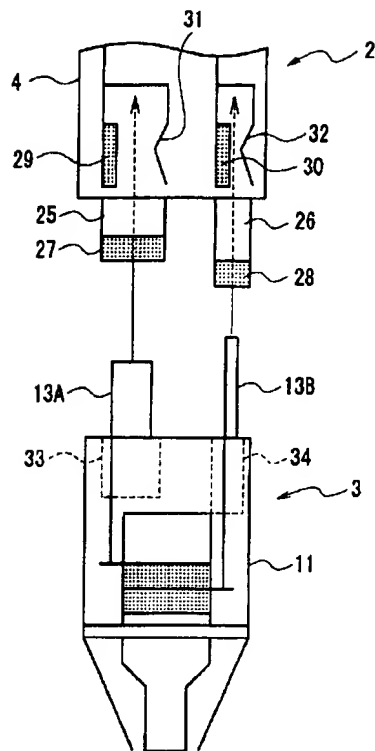
【図6】

[Figure 6]



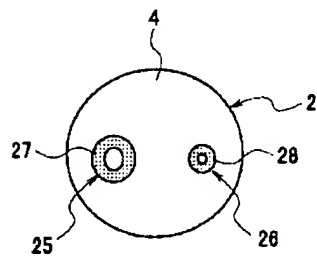
【図7】

[Figure 7]



【図8】

[Figure 8]



【図9】

[Figure 9]

